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COMMUNITY PROVISION FOR THE SERUM TREATMENT OF PNEUMOCOCCIC PNEUMONIAS*

I.

The Problem of the Pneumonias

It is well known that in our part of the world "pneumonia" is not only a very prevalent but a very deadly disease. The combined average lethal rate of the pneumonias is close to twenty-five per cent. As a cause of invalidism and death, the pneumonias outrank the communicable diseases of childhood. They occupy third place in the mortality bills of New York City, New York State and the United States death registration area, preceded only by the diseases of the heart and by cancer. They take a very large toll among people of the most productive age groups. There are few prevalent acute conditions which have such a high mortality or are as expensive to treat.

Within the last decade the curative value of concentrated specific immune horse serum has been established for the pneumococcus pneumonias of Type I and Type II, and evidence is rapidly accumulating that it is also efficacious in Types V, VII, VIII and XIV. The general introduction of specific serum therapy has been slow. The possible reasons for it are:

* Report of the Committee on Public Health Relations of The New York Academy of Medicine by a special subcommittee: Russell L. Cecil, *Chairman;* Jesse G. M. Bullowa, Henry T. Chickering, E. H. L. Corwin, *Secretary.*

1. The lingering of the dictum that the disease is self-limited;
2. Hesitation on the part of general practitioners to employ serum intravenously;
3. The difficulty in obtaining serums and their high cost;
4. Lack of facilities for the differentiation of pneumococci;
5. Failure on the part of health authorities, except in New York, Massachusetts and several other communities, to recognize the communicable character of the pneumonias, and to urge appropriations for the free distribution of the antipneumococcus serums.

The Bureau of Laboratories of the New York City Health Department, the Rockefeller Institute and several of New York's hospitals, notably Bellevue and Harlem, have made very important contributions to the development of specific therapy for pneumonia.

II.

A Brief Historical Retrospect

It has been established that the etiologic factor of lobar pneumonia in man is the pneumococcus, although other micro-organisms are sometimes identified with true cases of lobar pneumonia. The following Table gives the bacterial flora in lobar pneumonia on the basis of 2,000 cases:*

	Cases	*Per Cent*
Pneumococcus	1913	95.65%
Streptococcus hemolyticus	76	3.8 %
Pneumobacillus Friedländer	8	0.4 %
Hemophilus influenzæ	1	0.05%
Staphylococcus aureus	2	0.1 %

It is impossible within the short space of this section to give a detailed history of the evolution of pneumonia serum therapy. Only the highlights will be touched upon.

To Weichselbaum is conceded the credit for having definitely established in 1886 the causal relation of the

* Cecil, Baldwin and Larsen, Archives of Internal Medicine, 40, p. 253, 1927.

pneumococcus to lobar pneumonia. The discovery by Neufeld of the solubility of pneumococci in bile led to the method of differentiation between the pneumococcus and the streptococcus. Pioneering work in the utilization of immune serum in pneumonia was done by the Klemperers in 1892, followed by Eyre and Washbourn, and by Elser and Roper at New York Hospital in 1909 and 1913.*

In 1909 Neufeld and Haendel first demonstrated the existence of antigenically different types of pneumococci. They also noted that the protective action of the anti-pneumococcus serum in mice was limited to the homologous strain of pneumococcus. In the two papers which they published in 1910 they discussed the need of type determination for effective serum therapeusis. They gave an account of the results obtained by them in treatment of patients with intravenous injections of potent antipneumococcus horse serum. They called attention to the need of administering large doses to obtain beneficial results.**

In this country it was under the auspices of the Medical Commission for the investigation of Acute Respiratory Diseases of the Department of Health of the City of New York that the earliest work on the pneumococcus began. This Commission was organized at the suggestion of Hermann M. Biggs in 1904 and a special grant of $10,000 for the work was made by the Board of Estimate and Apportionment. E. G. Janeway was the President, William Osler, Vice-President, and T. Mitchell Prudden, Secretary; the other members being William H. Welch, L. Emmett Holt, Frank Billings, John H. Musser, Theobald Smith and Francis P. Kinnicutt. The cooperation of a number of outstanding bacteriologists and pathologists was secured under the leadership of Biggs, William H. Park and Anna Williams. Reports were first published in the Journal of Experimental Medicine and Biology in 1905, and in the Journal of Infectious Diseases in 1906 and 1907.

* Joseph C. Roper, "Serum Treatment of Pneumonia," Medical Record, Vol. 86, No. 5, pp. 187 and 224.

** "Weitere Untersuchungen m.d. Pneumokokken Heilsera" Arb. a.d.k. Gesundheitsamte, 1910, 34, pp. 293-304; 36, p. 166.

In Part I of the Report of the Commission, published in 1905, there appeared a paper by Katherine R. Collins, of the Bureau of Laboratories of the City Department of Health, in which the following conclusions were presented:

1. "Pneumococci, by reason of their agglutinating properties, exhibit a tendency to separate into numerous groups similar to streptococci."
2. "Pneumococcus mucosus forms a distinct and consistent variety. The production by it of common agglutinins for some pneumococci and the resistance of the agglutinins produced by it to absorption by the streptococcus indicate a nearer relation to the former than to the latter organism."

Further contributions to the biology of the pneumococci were made by Dochez and Gillespie of the Rockefeller Institute in 1913, and by Dochez and Avery in 1915. Their studies showed that there were at least three distinct and fixed types of pneumococci designated respectively as Type I, Type II and Type III, which comprised about 80 per cent of all the strains of pneumococci encountered in patients with lobar pneumonia. The pneumococci which were found in the other patients were for the most part unrelated to one another and were designated as Group IV.

This work led to extensive clinical studies with unconcentrated antipneumococcus Type I serum at the Rockefeller Institute by Cole and Dochez (1913), and later by Avery, Chickering, Cole and Dochez (1917). In 1920, Cecil and Blake showed that monkeys inoculated with a fatal dose of pneumococcus Type I could be protected with specific Type I horse serum.

As a result of the influenza pandemic of 1917 and 1918, the Metropolitan Life Insurance Company appointed a Commission known as the Influenza and Pneumonia Commission of the Metropolitan Life Insurance Company. This Commission held its first meeting on July 15, 1919. It consisted of Milton J. Rosenau, Chairman, William H. Park, G. W. McCoy, W. H. Frost, E. O. Jordan, Lee K. Frankel and Augustus S. Knight, Medical Director of the

Metropolitan Life Insurance Company. The Commission is still in existence, with the same Chairman, but with a changed membership. During the year 1920, the work of the Commission was limited to epidemiologic and immunologic studies of influenza. In the following year a series of studies on the prophylactic use of influenza vaccines was made and experiments carried on in New York and Massachusetts with pneumonia vaccines. At that time it was found that the extracts of the pneumococcus had no better prophylactic virtues than the vaccines usually made.

The refinements in the production of the pneumococcus immune serum were due to a number of workers. New York City was the pioneer in this field, the first really practical method for concentrating a specific immune serum, namely, diphtheria antitoxin, having been devised in the Bureau of Laboratories of the Health Department by Robert B. Gibson in 1905. Subsequently, various modifications and improvements were made by Banzhaf, also in the Bureau of Laboratories of the Department of Health.

In 1915, Gay and Chickering were the first to show that the immune bodies in pneumococcus serum could be separated by biologic methods. Further fundamental work along these lines was done by Huntoon. Though Huntoon's antibody solution possessed definite therapeutic value, it frequently caused severe and sometimes fatal reactions. It was used in the treatment of several hundred patients at Bellevue Hospital.

In 1924, working under Rosenau at Harvard University, Felton developed a concentrated antibody solution by precipitating the euglobulins with large quantities of distilled water. The production of Felton's serum was aided by a grant of $10,000 for three years, which was placed at the disposal of Dr. Park by Mr. Lucius N. Littauer, who, by subsequent grants, is said to have given the sum of $120,000 toward the study of pneumonia. The value of Felton's serum was conclusively demonstrated at Bellevue Hospital by Cecil and Sutliffe and by Cecil and Plummer; and at Harlem Hospital by Bullowa and Rosenbluth.

At this time, with the aid of another grant by Mr. Littauer, the first effective antipneumococcus Type II serum was produced at Otisville and refined by Felton. Its clinical value was demonstrated when it was used on the first, second or third day. Its efficacy in cases presenting bacteremia was proved by Baldwin at the New York Hospital.

In 1926, Georgia Cooper, and her co-workers at the Bureau of Laboratories of the Department of Health, began the publication of a series of studies on the different strains of pneumococci, which had been previously classified as Group IV, and succeeded in resolving them into 29 types. They obtained pure cultures and antiserums for each type. In the words of Rosenau, "This is considered one of the outstanding pieces of work of the Metropolitan Influenza and Pneumonia Commission." As a result of these studies the species of pneumococcus is now divisible into 32 types, each designated by Roman numerals.* Some of these types are more prevalent in adults; others in children.

In 1928, with the aid of funds given to New York University through Dr. Park, and in 1930, through funds given to Dr. Charles Hendee Smith by the Commonwealth Fund, and as the result of a study of pneumonias in children at Harlem Hospital through funds given Dr. Bullowa by the Littauer Fund, Types I, VI, XIV and XIX were recognized as the most common invaders of children. Further work in this field was financed by the Altman Foundation for the production and testing of serum for additional types that were associated with pneumonia in children.

In 1929, reports of the value of concentrated serum for the newer types began to be published. The clinical evaluation of the newly segregated types, V, VII and VIII, was largely the work of the Harlem Hospital workers, under the Littauer grant. This work was subsequently confirmed by the Boston City Hospital group.

* Some of the types are so closely related that the question has arisen whether they should be continued as separate entities; this applies particularly to Type XXVI, which is being classified with Type VI, and to Type XXX, which is now being classified with Type XV.

At that time an appeal was presented to the Commonwealth Fund by the Massachusetts Department of Public Health for a pneumonia study and service. The clinicians who experimented with the use of the serum in Boston were unanimous in believing that the serum should be distributed, the product made more potent, the cost lowered, and reliable data obtained on the dosage required if the benefits to be derived from the antipneumococcus serum were to be enjoyed by all those who stood in need of it. The Commonwealth Fund made the first grant in 1930, with the expectation that the demonstration would continue for five years. An advisory committee, under the chairmanship of Dr. George H. Bigelow, then Commissioner of Health of the State of Massachusetts, was organized, and Dr. Roderick Heffron became the executive who carried on the field work. The demonstration had a twofold objective, "the evaluation of pneumonia serum under the conditions of the general practice of medicine, and the development of plans for the distribution of this serum for the treatment of those patients who might reasonably be expected to benefit from its use."* It thus embraced problems of scientific research as well as of administrative procedure.

It is now recognized that the most effective use of serum depends upon the administration of the required amount in the shortest possible time. This is practicable only when the serum is of high titre. Felton's concentrated horse serum permits larger doses to be administered in smaller bulk and more effectively; it simplifies the procedure and reduces the incidence of primary reactions and of serum sickness.

Experiments are now being conducted by Goodner, Horsfall and McLeod at the Rockefeller Institute with unconcentrated but processed rabbit serum, and at Harlem Hospital under the direction of Bullowa with concentrated rabbit serum. Their limited experience to date indicates

* "The Commonwealth" Final Report of the Massachusetts Pneumonia Study and Service, 1931-1935, p. 4.

that rabbit immune serums have definite biologic advantages over horse immune serums.

III.

Development of the Rapid Method of Pneumococcus Type Determination

In view of the importance of early recognition of the type of pneumococcic infection for successful therapy, the development of the technique of rapid type determination from the sputum is an important milestone in the evolution of the specific treatment of pneumonias. The pioneer work in this field was done by Krumwiede and Noble of the Bureau of Laboratories of the New York City Department of Health, who in 1918 worked out a method whereby they were able to differentiate the types from the sputum within a comparatively short period of time; its reliability was not established. Later Sabin devised the stained slide agglutination technique which saved time and material. The original methods of typing required considerable quantities of mouse peritoneal exudate for the agglutination tests.

Although Neufeld had described in 1902 the specific capsule swelling reaction, occurring when the pneumococci are acted on by the homologous immune serum, he appears not to have recognized its applicability to typing until nearly thirty years later. In 1931, in a study with Etinger-Tulczynska* he described the reaction again, and in a footnote, stated that it was a convenient method for determining types of pneumococci. Credit for introducing the Neufeld swelling reaction for direct typing of sputum in Great Britain goes to Richard R. Armstrong of St. Bartholomew's Hospital, and to W. R. Logan and J. T. Smeall of the Royal Infirmary of Edinburgh, who reported it simultaneously in the British Medical Journal of January 30, 1932. It was introduced in this country in 1932 by Goodner at the Hospital of the Rockefeller Institute, and was first described here by Sabin early in 1933, after a

* Zeitsch. f. Hyg. u. Infektiouskrank., Vol. 112, fasc. 3, p. 492.

test of it in 100 cases at Bellevue Hospital (J.A.M.A., 100, p. 1584). In 1934, Beckler and MacLeod reported on the use of the method at the Bacteriological Laboratory of the Massachusetts Department of Public Health in 760 specimens of sputum over a period of 16 months (J. Clin. Inv. 13, p. 901). On September 3, 1934, at a meeting of the American Public Health Association in Pasadena, Cooper and Walter reported on the reliability of the Neufeld reaction as ascertained in the tests made at the Bureau of Laboratories of the Department of Health in New York City (Am. J. P. H., 25, p. 469). Bullowa estabished the accuracy of the Neufeld method by direct cultures from the lung and blood.

IV.

Pneumonia Prevalence in New York City

Although pneumonia has been a reportable disease in New York City for many years the Health Department figures fail by a considerable margin to reflect the true number of cases of pneumonia in the City. An approximation of the divergence can be obtained by a comparison of the 16,972 reported cases of pneumonia in the year 1933, with the 20,163 patients with pneumonia known to have been discharged from the hospitals in that year. This discrepancy becomes even wider when it is realized that not all of the hospitals in the City were included in the study, nor were institutions other than hospitals. The prevalence of the pneumonias can therefore be only approximated from the mortality rate. The total number of pneumonia deaths has been decreasing annually since 1931, except for a slight upswing in 1936. During the last six years the number of deaths from pneumonia in New York City varied between 6,400 and 9,200. The average for the last three years has been 6,500 deaths. Assuming a case fatality rate of 25 per cent, the average number of cases of pneumonia during the last few years has been 26,000 per annum. There are no statistics to indicate how many of these pneumonias were of pneu-

mococcus origin, but assuming that 95 per cent of the lobar pneumonias, and 75 per cent of the bronchopneumonias were of this etiology, the total pneumococcic infections numbered 22,000. When the very young and the very old are eliminated it is safe to say that about 10,000 patients would be benefited by specific serum therapy. This figure should be borne in mind when plans are laid for the supply of antipneumococcus serum for New York City.

V.

Type Incidence in Pneumococcic Pneumonias

Many epidemiologic studies have been made of the types of pneumococcus found in patients ill with pneumonia. Considerable variations in the percentage distribution of the prevalent types have been observed. The latest study available is that of Bullowa and Wilcox, published in the March 1937 issue of Archives of Internal Medicine, which analyzes the distribution of the pneumococcus types and their variations in incidence and mortality for adults and children, on the basis of 3,371 cases treated at Harlem Hospital from July 1, 1928, to June 30, 1936. This study shows that among adults there are considerable variations in the several types of pneumonia from year to year; that Type I is consistently the most prevalent, followed by Types III and VIII, although in the year 1934-1935, Type V was next in prevalence to Type I, and in 1935-1936, Type VII took that place. The conclusion drawn from this study is that the endemic pneumonias are a series of diseases which vary in occurrence from year to year and from month to month, and that further studies of this character are needed to determine whether the specific types of pneumonia have individual cycles. The study also shows that there is a marked difference in the types of pneumonia found in children and adults living in the same community.

The variation in the prevalence of the pneumococcus types from year to year makes it difficult for the Bureau of Laboratories always to have adequate amounts of the dif-

ferent immune serums available to meet changing conditions.

VI.

Organization of Pneumonia Control in Massachusetts and New York State

The modern practical application of the antipneumococcus serum had its birth in New York City. As far back as 1911, the Research Laboratory of the Department of Health began the production and limited distribution of a polyvalent antipneumococcus serum made from strains prevalent at that time.

Four years later the Division of Laboratories and Research of the New York State Department of Health prepared Type I specific antipneumococcus serum for general distribution, and in 1917 sputum typing was added to the list of procedures required for qualification of approved public health laboratories rendering such service.*

In 1917 the Massachusetts Department of Health likewise undertook the production and distribution of pneumonia serum. The difficulties associated with the administration of unconcentrated serum and the frequency of severe serum reactions were responsible for the slow adoption of this mode of therapy. The intensive five-year pneumonia study and demonstration carried on in Massachusetts from 1931 to the end of 1935, with the financial aid of the Commonwealth Fund, paved the way for an effective plan of administrative organization.

In the fall of 1935, the New York State Department of Health undertook to organize a comprehensive pneumonia control program embracing not only the production and distribution of concentrated antipneumococcus serum, and the expansion of available laboratory facilities, but also active participation in graduate professional information, in lay education, in the expansion of public health nursing service to pneumonia patients, and in research on the epi-

* Edward S. Rogers, "Control of Pneumococcus Pneumonia," American Journal of Public Health, February 1937, p. 133.

demiology of pneumonia and the evolution of more adequate means for its control. This program was undertaken with the close cooperation of the State Medical Society and the New York State Association of Public Health Laboratories, with financial aid from the Metropolitan Life Insurance Company and the Commonwealth Fund.

In Massachusetts the serum for Type I and Type II pneumonia is being produced for general distribution through a system of so-called laboratory supply stations. There are 72 such stations scattered throughout the State. Thus far, only concentrated serums Type I and Type II are available to all physicians in the State. No charge is made for serum, regardless of the financial condition of the patient. Preparations are being made for distribution also of the therapeutic serums for infections of Types V, VII and VIII. This likewise is to be furnished without charge. In the distribution centers the Neufeld method of typing is used almost exclusively. In a few instances the Sabin or slide agglutination method is employed, either alone or in conjunction with the Neufeld method.

In order to conserve the available serum and to make it go as far as possible, two restrictions are being observed. No serum is given until the laboratory report indicates that the patient for whom it is requested is suffering from Type I or Type II infection, and then only for patients who have been ill for not more than four days. Physicians are requested to sign cards to this effect. Physicians who have received serums are expected to furnish the Department of Health with information concerning the patient after determination of the case. According to official report the two restrictions mentioned have encountered little criticism, although it would seem that it is very difficult to determine precisely the duration of the pneumonia from its onset to the time when the typing is done. The Massachusetts authorities are of the opinion that this time restriction aids in emphasizing the necessity of early typing and early treatment, which is so important in pneumonia. They admit that there are patients who, after the fourth day of illness, might be benefited by the administration of serum:

they are, however, prevented from changing the rule because of economic considerations. The distributing centers are authorized to issue serum in amounts of 60,000 units for Type I and 100,000 units for Type II. An additional 60,000 units for either type is permissible for the following three categories of patients:

a. Maternity patients.
b. Patients having a positive blood culture with Type I or Type II pneumococci in their blood, and
c. Patients whose temperature does not fall to 101° F. or under within eighteen hours, or in whom the temperature, after having fallen, has again risen to, or above, 101° F. in forty-eight hours.

In individual instances more than 60,000 units is given for the treatment of patients with persistent bacteremia, or to pregnant women.

Arrangements are under way to allot larger amounts of serum for older patients as it has been demonstrated that persons past middle age do not gain as much benefit from an average amount of serum as do younger persons.

In New York State the regulations differ somewhat from those of Massachusetts. Up to the beginning of this year only concentrated Type I antipneumococcus serum was distributed. During the year 1936, approximately 5,700 vials of 20 c.c. each of concentrated Type I were distributed. The 20 c.c. vials of Type I contain 25,000 therapeutic units. Type II is put up in 24 c.c. vials, containing 20,000 units, and its distribution began only on December 30, 1936.

The serums are distributed through laboratory supply stations. There are 106 of these for the distribution of Type I serum and 34 for Type II serum. The number of the latter will be increased as the need is demonstrated and the supply of serum becomes sufficient to meet increased demands.

In New York State, as in Massachusetts, the serums are given away entirely free to all classes of patients, but there is no restriction as to time limit for its administra-

tion. It is left entirely to the physician's discretion. He is, however, requested to fill out a form, giving certain fundamental data in order to obtain the serum. In New York State the minimum dosage recommended is considerably higher than that in Massachusetts—100,000 units for Type I cases and 160,000 for Type II cases.

VII.

Serum Production in New York City

The New York City Health Department Bureau of Laboratories has been producing and distributing antipneumococcus serum for eleven of the more prevalent types. The Table here produced gives the statistics of production of the various types during the years 1935 and 1936, in terms of vials.

PRODUCTION

Number of Vials of Antipneumococcic Serum Distributed for Therapeutic Use During 1935 and 1936

Types of Serums	1935 Uncon-cent. (1)	Concent. (2)	Total	1936 Uncon. (1)	Concen. (2)	Total
I & II (Bivalent)	3,646	1,191	4,837	2,548 (3)	1,416 (3)	3,964
II & V (Bivalent)	170 (3)	339	509		236 (3)	236
III & VIII (Bivalent)		413	413		25 (3)	25
I	1,292	466	1,758	1,613 (3)	615 (3)	2,228
II		273 (3)	273		1,501	1,501
IV		352	352		174 (3)	174
V	380	385	765	333 (3)	682	1,015
VI		253	253		88	88
VII	567	390 (3)	957	794 (3)	110 (3)	904
VIII	706	366	1,072	1,234	778	2,012
IX		145	145		165	165
XIV	234	307	541	502 (3)	72 (3)	574
XVIII		123	123		328	328
XIX		39 (3)	39		91 (3)	91
Total	6,993	5,042	12,037	7,024	6,281	13,305

(1) Vials containing 25 c.c. unconcentrated antiserum—potency 800 to 3,000 units per c.c.—average 1,000 units per c.c.

(2) Vials containing 10 c.c. concentrated antiserum—potency 800 to 8,000 units per c.c.—average 2,000 units per c.c.

(3) Available only during part of period.

The production of effective serums for the different types of pneumonia is not a simple matter. Horses must be immunized over an average period of almost fifteen months to develop antibody content of sufficient potency; some horses respond better than others. During the past few years the Bureau of Laboratories has maintained at Otisville an average of about forty horses for antipneumococcus serum. Part of the work involved in the process of concentration of the serum is done in New York City.

During the past year the Bureau of Laboratories of the Health Department produced $85,000 worth of antipneumococcus serum. It is estimated that each horse produces about $2,000 worth of serum per year. These figures are based on the actual cost of production and are the same as those of the Massachusetts State Health Department Laboratory, namely, $.35 per 1,000 units of concentrated serum, Type I and Type II. The cost varies somewhat with the type and whether the serum is monovalent or bivalent. For practical purposes, $.35 per 1,000 units is a basic figure. Assuming the average therapeutic dose to consist of 100,000 units, the average cost of serum per patient is $35.

In planning for the future the Department of Health in this City must determine the extent to which the City is ready to make available this life-saving remedy to all those in the population who are unfortunate enough to develop the disease, and who are unable to purchase the serum from commercial laboratories.

It is the opinion of this Committee that in view of the communicable character of the pneumococcic infections and their mode of spread through congestion in places of work, in public conveyances, schools, etc., the city should provide this serum on the same basis as it provides all other biological products — serums, antitoxin, toxoids and vaccines.

The cost of community provision of antipneumococcus serum can readily be established if the demand is forecast. In Part IV of this Report it has been estimated that on the

average, 10,000 persons in New York City may be in need of serum during the year. In view of the slowness with which this specific serum therapy has been adopted, it is unlikely that a maximum demand will develop during the next year. It is more likely that the demand may not exceed the requirements of 5,000 persons. On the basis of $35 as the average cost, the expenditure for serum which the City would have to incur would be $175,000. It is possible that the demand in the future may exceed this estimate. In the opinion of this Committee it is advisable for the City to plan for the increased production of the serum rather than depend on the supply from commercial laboratories. In view of the experiments with rabbit serum it is possible that in the future, most, if not all of the antipneumococcus serum may be produced in rabbits. This may decrease the cost.

VIII.

Facilities for Clinical Consultation and for Typing

The successful administration of serum is a highly technical procedure requiring expert knowledge. Advice is often asked of the Bureau of Laboratories concerning technical procedures and no one with the necessary clinical experience and time is as yet available to render the required service. It is the opinion of the Committee that a consulting service should be established, similar to that provided by the Laboratory in connection with meningitis and other communicable diseases of the central nervous system. It should be headed by a physician well trained in the knowledge and technique of serum therapy. A physician of this character should command a salary commensurate with the chiefs of other clinical services in the Department of Health. In addition, the Health Department should make arrangements with a number of men located in various districts of the City who are well known for their competence in this field, and who would be willing to respond to calls for consultation service at moderate fees which the City would be able to pay. It has been estimated that for a time at least about ten such men would be

required to answer the emergency calls. The cost of such a consulting service, exclusive of the salary of the Supervisor, would probably not exceed $10,000.

As has already been stated, the effectiveness of serum therapy depends on its early administration. Facilities should be provided for quick diagnostic laboratory service. It is suggested that at least one laboratory be established in every borough for type determination, these laboratories to be centrally located and available daily to all physicians from ten to six o'clock or later. In view of the fact that such diagnostic laboratory work is sometimes needed during the night it is recommended that one of the laboratories be maintained throughout the night. Each laboratory would require two technicians. The Committee therefore recommends that provision be made for fourteen technicians (two for each of the six typing stations and two to act as substitutes). The average salary of a technician is about $1,000 a year. This would add to the budget about $14,000 annually. Not all of this sum should be charged to pneumonia because during the months when pneumonia is not prevalent these technicians would be assigned to other work in the Bureau of Laboratories, which is understaffed.

IX.

The Pneumonias as a Public Health Problem

Early recognition and early serum treatment are needed to check the spread of the pneumonias. Treatment of the pneumonias requires the same aseptic technique that applies to other communicable diseases. The incidence and mortality of communicable diseases has been lowered by segregation in special hospitals. It is therefore recommended that the pneumonia patients treated in hospitals be properly segregated and cubicled.

In view of the emergency character of the pneumonias, the hospitals should consider pneumonia patients in the same category with acute surgical cases, both from the standpoint of immediate preferential admission and of emergency service, night or day, by responsible members of the clinical and the laboratory staffs.

X.

Recommendations

1. During the next few years the City Department of health should engage in a vigorous campaign against pneumonia. It should establish a Division of Pneumonia Service in the Bureau of Laboratories, headed by a properly qualified physician.

2. Through the regular medical channels physicians should be made cognizant of the fact that serum is life-saving in certain types of pneumonia and that the particular type of pneumococcic infection from which the patient may be suffering should be determined at the earliest possible moment. Facilities for the rapid determination of the type of infection should be made available at public expense at conveniently located points throughout the City. At least one such center should be maintained in each borough from ten in the morning until late in the evening, and at least one laboratory should be available for type identification during the night.

3. Because of the communicable nature of the pneumonias it is highly desirable that pneumonia patients in hospitals be segregated in cubicles, and that a complete aseptic technique be followed.

4. Pneumonia patients should be considered in the same urgent category with emergency surgical cases. Certain physicians on the attending staff should be made responsible for the treatment of these patients and should be on call day and night, as is the custom on the surgical services.

5. In connection with the Division of Pneumonia Service of the Department of Health, a clinical consultation service similar to that rendered by the Meningitis Division should be established to aid physicians in the administration of serum therapy, and in the taking of specimens of blood and sputum for bacteriological study.

6. In all instances of death from pneumonia, physicians should be requested to report the precise nature of the invading organism.

7. Concentrated serum for the prevailing types of pneumonia should be made available without cost to physicians requesting it, provided the type of pneumonia has been ascertained prior to the request for serum.

8. The control work of pneumonia and the production of therapeutic serums should in no way be allowed to interfere with the fundamental research activities of the Bureau of Laboratories of the Department of Health.

9. Adequate funds should be provided to the Department of Health for pneumonia control work and to further the necessary research. The minimum budget required for the year 1938 is estimated at $225,000, of which $85,000 is for the continuance of production of serums on the present scale, $100,000 for the purchase of additional serums pending the development of production facilities at Otisville Farm, and $40,000 for the salary of the chief of pneumonia control, the payment of consultants' fees, for equipping diagnostic type determination centers, for the maintenance of technicians at these laboratories, and other incidental expenses.

10. It is estimated that a capital outlay of about $200,000 may be required for the construction of new stables at Otisville to house additional horses; for the required extensions to the Laboratory; for the residence of the additional personnel required; and to meet other expenses incidental to the increase in the production of the serums. Should the use of rabbit serum prove efficacious, the cost of the construction for housing the animals would be much lower than estimated. It is recommended, however, that the entire sum be appropriated so that the Department of Health may be in a position to meet emergencies during the next year promptly.

11. It is recommended that the serum produced as a result of the recent State appropriation of $400,000 under the Hawkins-Schwartzwald Act be made available to all parts of the State, including the City of New York, in proportion to their relative requirements, as a supplement to the pneumonia control work of local communities.

July 1, 1937

ROBIN AND JOHN ADAIR*

ARCHIBALD MALLOCH

A short time after the close of the European War in conversation in London about early Canadian affairs with the late Sir Arthur George Doughty, in charge of the Public Archives of Canada at Ottawa, I was informed that the surgeon shown in the painting of the *Death of Wolfe,* by Benjamin West, (Fig. 1) was Robert Adair the hero of the famous song *Robin Adair.* The former half of this statement was corroborated in Stephen Paget's well-known life of John Hunter, *Man of Science and Surgeon,* in the "Masters of Medicine Series" in which it is said that in 1760 John Hunter received his appointment as Staff-Surgeon on the expedition to Belle-Isle from the Inspector-General of Hospitals, Robert Adair, who had been with the army at the siege of Quebec.

You can imagine my astonishment when I consulted Col. William Johnston's authoritative work the *Roll of Commissioned Officers in the Medical Service of the British Army,* (Aberdeen, 1917), to discover no mention of Robert Adair's having served in Canada, but an allusion to the song. It seemed very unlikely that Johnston would not have found some official record of Robert Adair's appointment to the expedition against Quebec, had such been made. The notice of his death in the *Gentleman's Magazine,*[1] related no service in Canada. So I determined to try to clear up the matter, and on a subsequent visit, in 1924, to the Public Archives at Ottawa, Sir Arthur Doughty helped me to the utmost by allowing me to examine original manuscripts and by having copies of documents made. We found nothing to place Robert Adair definitely at Quebec in 1759, the year after his marriage. We did discover, however, that a John Adair was a surgeon with Wolfe. It was good to see that in Dr. J. Clarence Webster's book *Wolfe and the Artists, a Study of his Portraiture,* (Toronto, 1930, p. 69), it is stated that Robert Adair's portrait is wrongly painted in the famous picture, and that "a study of the

* Read 14 December, 1936, before the Historical Section of the College of Physicians of Philadelphia.

Figure 1

Photograph of Benjamin West's *Death of Wolfe*
(Reproduced by Permission of the National Gallery of Canada, Ottawa.)

army records proves that he was never at Quebec nor even in America." Dr. Webster writes: "It was John Adair who was a prominent surgeon with Amherst's forces in America, though he was not with Wolfe's army at Quebec, as far as is known." Dr. Webster's little book, by the way, is gracefully dedicated to a Fellow of this College, Dr. R. Tait McKenzie, whose fine statue of Wolfe, as you know, stands in Greenwich Park not far from the Royal Observatory.

It is not difficult to explain why we do not know anything very definite about the Army surgeons of that time or why more mention is not made of them, for, as R. Hamilton wrote in his book *The Duties of a Regimental Surgeon,*[2] "the Surgeon is held in an inferior light to the youngest ensign; and the King himself considers him so." Col. Johnston in his *Roll of the Army Medical Service,* also mentions this lack of esteem in which the surgeons were held when he says (p. xxv): "The pay and position of an Army Medical Officer was not attractive, so that a custom arose by which a Surgeon or Surgeon's Mate often purchased in addition the commission of an ensign, so adding to his pay and regimental status."

There is something very interesting about the painting of Wolfe, which was exhibited at the Royal Academy in 1771 and therefore had probably been painted shortly before, for the soldiers are represented in modern costumes instead of those of Greeks or Romans. Sir Joshua Reynolds and the Archbishop of York called on West when they heard of his intention to make such an innovation, but they could not dissuade him. West[3] said:

> The event to be commemorated happened in the year 1759, in a region of the world unknown to the Greeks and Romans, and at a period of time when no warriors who wore such costumes existed. The subject I have to represent is a great battle fought and won, and the same truth which gives law to the historian should rule the painter.

Reynolds[3] later said, very handsomely:

> West has conquered; he has treated the subject as it ought to be treated. I retract my ob-

jections. I foresee that this picture will not only become one of the most popular, but will occasion a revolution in art.

Which Adair is it that appears in the *Death of Wolfe?* It is a difficult question to answer, and it is also difficult to ascertain when it was first thought that Robert Adair was represented as the surgeon kneeling beside Wolfe. William Woollett executed an engraving, after West's painting, which was published in 1776. At the same time, he published a "Key to Six of the Portraits with the names affixed to each." Number 6 on the list is "Mr. Adair, Director and 1st Surgeon of the Hospital" without giving any Christian name. Louis Fagan[4] also states that several men depicted in West's painting were not at Quebec and adds that "Surgeon Adair, who is represented in attend-

Figure 2

Photograph of Mezzotint of Robert Adair by John Jones after a Painting by F. L. Abbott

(By Permission of The New York Public Library)

ance, was then at Crown Point", which is in Northern New York. As we shall see, official records show that John Adair was "Surgeon to the Hospital", that is, not just a regimental surgeon, and was at Quebec where he was *acting* Director, so Woollett's description applies to him. Someone then confused the two men and the *British Museum Catalogue of Engraved Portraits*[5] states that Robert Adair was the surgeon depicted.

Figure 2 is a reproduction of a mezzotint of Robert Adair by J. Jones, after L. Abbott for comparison with an enlargement of the surgeon in the *Death of Wolfe,* (Fig. 3). I leave it to you to decide whether they are pictures of the same man. Is it the same chin in both? I am sorry that I cannot find a picture of John Adair to compare it also with the portrait in the Wolfe painting. Dr. Webster[6] points out that "some unpleasant gossip" has come down that West asked payment of men for the privilege of

Figure 3

Enlarged Photograph of the Surgeon in Benjamin West's *Death of Wolfe*

(Reproduced by Permission of the National Gallery of Canada, Ottawa.)

having their portraits painted as if they were present at the time of Wolfe's death. He quotes from General Mahon's life of Brigadier-General James Murray that West asked Murray to allow his portrait to be included, but Murray replied: "I was not there (i.e. near Wolfe). I was commanding the troops in my charge." Again Dr. Webster says that Doughty in his *Siege of Quebec* "states that John Hale, of the 47th Regiment, was asked to pay West £100 for the privilege of forming one of the group, but he declined, with the result that he was omitted." If it is really a representation of Robert Adair, then he must have been party to such an arrangement. It may be merely a coincidence and of no real significance, but it is certainly of interest that West painted an altar-piece, as he had done elsewhere, for the chapel of Chelsea Hospital, where Robert Adair was surgeon from 1773 on.[3]

I have been making notes upon the careers of these two Adairs, Robert and John, for some years and it seemed that they might be interesting enough to put down on paper, although by so doing I know little will be added to the history of medicine.

2.

Unfortunately we do not know nearly as much about John as about Robert Adair. The date and place of his birth are unknown but Colonel Johnston writes that he was appointed on 30 April, 1746, Master Surgeon with Major-General James Sinclair. It was intended that Sinclair should command a force of six thousand men against Quebec, "but the expedition was delayed too long to permit of its sailing that season", so it was decided to attack the coast of Brittany "to surprise Port L'Orient, where the French East India Company had its depôt of stores and ships." Sinclair laid siege to the port but this was unsuccessful although he did succeed in destroying the forts in Quiberon Bay and then returned to England[7].

John Adair was placed on half-pay before 1750 and his next appointment was that of "Surgeon to the Staff on Braddock's Expedition (Fort Duquesne)", dated 24 September, 1754. His commission[8] was granted on the

same day as those to Sir James Napier and John Cherrington, but Napier's reads, "Director to the Hospital." We all know the fate of Braddock's Expedition and how he was mortally wounded by the French and Indians when still about seven miles from Fort Duquesne, now Pittsburgh. Although I have been through Major-General Braddock's Orderly Books, published at Cumberland, Maryland in 1880, I can find no mention of John Adair. "Doct^{r} Napper, Director of the 2^{d} Hospital" is named; this probably refers to James Napier[9] especially as the two names are sometimes referred to as one (See *Dictionary of National Biography*).

In the Army List for 1755, John Adair is named as "Surgeon of hospitals in North America." Then in the War Office Papers are entries for John Adair as "Master Surgeon in hospitals in North America" from 25 December, 1756—24 June, 1757; and again 25 December, 1757—24 June, 1758, under Loudoun. John Campbell, fourth Earl of Loudoun,[10] was appointed Commander-in-Chief of the British Forces in North America in March 1756, but was recalled to England a year or so later as at Halifax where he wasted his time, he was "unable to decide on a definite course of action" in order to lay siege to Louisbourg. A Philadelphian is responsible for an amusing quip about Loudoun, that he "was like Saint George upon the signposts, always on horseback but never advancing." General Amherst succeeded Loudoun and was in command of the army at the siege and capture of Louisbourg, the French stronghold on Cape Breton, in June and July, 1758. John Adair acted as Director of Hospitals there, "though without a Commission as such."[11] I could find no mention of John Adair in John Stewart McLennan's monumental history *Louisbourg from its Foundation to its Fall,* 1713-1758, published in London in 1918.

John Adair also acted in the same capacity in Wolfe's expedition against Quebec. Monckton was second in command and it is probable that John Adair went there with him. You all know the story of how the troops scaled the cliffs above Quebec during the night of 12-13 September,

1759, at a spot now known as Wolfe's Cove, and engaged the French under Montcalm on the Plains of Abraham. Wolfe was mortally wounded, but said, "I die contented." Monckton was also wounded but he recovered.

We know from a letter from Monckton (see below) that John Adair acted as Director of Hospitals with the expedition against Montreal a year after the fall of Quebec, and it is probable he served there under James Murray who had been one of Wolfe's three brigadiers. British troops from Quebec under Murray, from New York under Amherst, and from Crown Point under Colonel William Haviland all converged on Montreal, and on 13 September, 1760, De Vaudreuil and his French troops—all that remained in the country—laid down their arms.

On 2 November, 1761, John Adair was commissioned by General Amherst, Director of Hospitals with Major-General Monckton's expedition to Martinique, the naval force being under the command of Rodney. The expedition was successful, and on 4 February, 1762, Fort Royal capitulated after some sharp fighting.

Monckton returned to New York and on 14 August, 1762, we find him writing to "The Right Honorable the Secretary at War" (Charles Townshend) recommending, as follows, that John Adair be put on half-pay as Director of Hospitals for he had been struck off on his arrival in New York in June.[12]

New York August
ye 14th 1762.

Sir,

I am sorry to be so troublesome to you But where Merit is in Question, as in this case, I am convinc'd you will be good enough to Excuse it.

Mr. Adair Surgeon of the Hospital, who has been here the whole War, with great Credit, both as to Diligence, & Abilitys in his Profession, & who has served as Director, though without a Commission as such — On the Expeditions against Louisbourgh, Quebec, & Montreal, and with one

for the time, With the Army under my Command, Employ'd against Martinique—Is hopefull Sir, that he has merited to be put on the Half Pay List as Director; As he thinks nothing but his attendance here on his Duty, has prevented him from being a Director long before this — Many younger than himself in his Branch having been Prefer's to it.

I could not Refuse him, Sir, this Testimony of his Merit, having been well acquainted with his Service —

I have the Honour to be,
with Great Esteem
Sir
Your most obedient
Huml. Servt.
Robt. Monckton

The Right Honble
the Secretary at War.

This request was repeated in Monckton's letter of 27 October, but I cannot discover if it was granted. John Adair was shown on half-pay for the last time in the Army List of 1799 but as was often the case in those days an officer's name continued to appear for some years after his death. Mr. A. S. White, Deputy Librarian of the War Office kindly writes to me that in the *Gentleman's Magazine* for 1794 under "Deaths" and with the date of 9 September, 1794, appears the following notice: "At his lodgings in Charles Street, St. James's Square, John Adair, formerly Surgeon General to the Army in America under General Wolfe."

3.

Robert Adair was apparently born in Ireland about 1710 or 1716, but the exact date and his parentage, except that he came from the "middle rank of life," remain unknown. The chief sources of information are found in Col. Johnston's book and in a curious anonymous tract, *Memoirs of the Life of Robert Adair, Esq.,* written in the high-falutin style of the period, published in London in 1790, on the title-page of which is the well-known quota-

tion from Ovid (*Sic*), "omnia vincit amor." Another account is found in the first six pages of *The Lounger's Common-Place Book*,[13] published anonymously, the author of which is known to have been Dr. Jeremiah Whitaker Newman (1759-1839). From the similarity of this to the tract and the identity of some of the phrases, it is safe to assume, as Pinkerton[14] did, that they were both written by the same hand. Adair was known in London as the "Fortunate Irishman", an apt description as will soon be seen. He was a person of pleasing address and had "no enemies but his passions" and is said to have been the "favourite of the fair" and to have "played the Devil with the women"! He was a pupil to a medical man in Ireland but fell in love with his master's wife, and, be it said, she fell in love with him. On account of this "early amour" he had to decamp from Dublin in haste and sought his fortune elsewhere, never to return.

There are now certain discrepancies in the accounts of events in the life of this adventurer. He became a Member of the Company of Barber-Surgeons in 1738, a fact noted by Stephen Paget in his life of John Hunter. The present Master of the Company in a letter to me assures me that he was a Member. It is also certain[15] that he was appointed Surgeon to the Forces in Flanders, 20 March, 1742, afterwards on half-pay, then Chief Surgeon to the Hospitals and Inspector-General of the Regimental Infirmaries, 3 March, 1756. The facts are irrefutable but Newman would have things happen in a far more romantic way. He says that Adair set out from Dublin for London to seek his fortune as a surgeon there. His first stroke of luck came soon after he landed at Holyhead but I cannot do better than quote from the Memoirs[16]:

> . . . for on his road from that place to London, the carriage of a lady,[17] whose equipage and attendants were splendid, being overturned, and a servant enquiring for a surgeon, he offered his services, which were accepted, bled her, and recommended an application to a slight injury on her hip; in short, by his tender assiduity he made such

> an impression on his patient, that she requested that he would accompany her in her carriage to town.
>
> She proved to be a woman of fashion, at that time well known in the polite world, but on the wrong side of nine-and-thirty, and had been a famous demi-rep and free thinker . . .
>
> When he took leave of her in town, she put a hundred pound bank-note into his hand, gave him a general and pressing invitation to her house, made a point of introducing him to all companies that could forward his professional advancement, left him a handsome legacy, and, what decided the fate of his life, it was at her house he first beheld Lady Caroline Keppell (*sic*), daughter of the Earl of Albemarle.
>
> The emotions of this amiable woman, at first seeing Mr. Adair, are said to have been singular, sudden, and violent, so much so as to have been noticed by the company present, and to have occasioned her soon after quitting the room.
>
> Our hero was not a likely person to suffer a behaviour so flattering to the feelings of a young man to escape his penetrating eye, more especially in a woman whose rank and family would add splendor and dignity to his future life.
>
> We may easily believe that he neglected no means that love and opportunity could give him, to improve so sudden and (if I may be allowed the expression) so extraordinary a predilection in his favour.

Lady Caroline Keppel was the daughter of William Anne, Second Earl of Albemarle, and his wife, Lady Anne Lennox, daughter of Charles, first Duke of Richmond. Figure 4 is from a photogravure of her portrait painted by Sir Joshua Reynolds.[18] She was born in 1737 but it is not recorded when she and Adair met. It is known that she sat for Reynolds in 1755 and 1757. Lady Caroline's family

Figure 4

Photograph of Painting by Sir Joshua Reynolds of Lady Caroline Keppel

(From Graves and Cronin, *A History of the Works of Sir Joshua Reynolds*, London, 1899-1901.)

naturally did not look with favour upon her falling in love with this almost penniless, though handsome, young Irishman and sought by all manner of means to distract her attention into other channels:[19]

> Amusements, a long journey, an advantageous offer, and other common modes of shaking off what was considered by the family as an improper match, were alternately tried; but in vain; the health of Lady Caroline was evidently impaired, and the family at last confessed, with a good sense that reflects honour on their understandings as well as their hearts, that it was possible to prevent, but never to dissolve an attachment; and that marriage was the honourable and indeed the only alternative, that could secure her happiness and life.

W. F. Prideaux says[20] that it was during one of these periods of temporary separation, in 1753 or 1754,[21] (Pinkerton says when she had been sent to Bath—*loc. cit.*), that Lady Caroline wrote the words of the song *Robin Adair* and set them to the old Irish tune of *Eileen Aroon*[22] which means "Ellen the secret treasure of my heart", a song of the fourteenth century. She had learnt this tune from her lover Robert Adair.

Here are the words:

What's this dull town to me?
Robin's not near;
He whom I wished to see,
Wish for to hear.
Where's all the joy and mirth,
Made life a Heaven on earth?
Oh! they're all fled with thee,
Robin Adair.

What made the assembly shine?
Robin Adair!
What made the ball so fine?
Robin was there!

What when the play was o'er,
What made my heart so sore?
Oh, it was parting with
Robin Adair!

But now thou art far from me,
Robin Adair!
But now I never see
Robin Adair!
Yet him I loved so well
Still in my heart shall dwell,
Oh, can I ne'er forget
Robin Adair!

It is interesting in looking over the files of that mine of information, *Notes and Queries,* to see how often this plaintive song or ballad has been discussed. It must be distinguished from the "rollicking sporting song commemorating . . . the Kilruddery Hunt"[20] in which a "Squire Adair" is mentioned. W. F. Prideaux wrote in 1896 that "those who have a leaning to the sentimental side of history" accept the version that the surgeon Robert Adair was the hero of the song and this was the opinion of William Pinkerton in 1864. This is the view of Col. Johnston also who has accepted that given in Grove's *Dictionary of Music.* It is curious, however, that neither the notice of Adair's death in the *Gentleman's Magazine* or Newman in his *Memoirs* make any mention of the song.

On the plaintive song, *Eileen Aroon,* several parodies have apparently been written; one a drinking song entitled *Johnny Adair of Kilternan: His Welcome to Puckstown,* of which I quote one verse:[14]

I could drink wine with you,
Johnny Adair.
O, I could drink wine with you,
Johnny Adair.
I could drink beer with you,
Aye, rum and brandy too,
O, I could get drunk with you,
Johnny Adair.

Robert Adair and Lady Caroline Keppel were married on 22 February, 1759.[23] As the author of the *Memoirs* observes "this auspicious union was the seal to Mr. Adair's good fortune." The statement that "he was soon appointed Inspector General of all Military Hospitals, with an income adequate to the importance and responsibility of the office"[24] must refer to his appointment as "Chief Surgeon to the Hospital of the Forces in Great Britain and Inspector of the Regimental Infirmaries, 3 March, 1756, and 27 October, 1760", which Col. Johnston quotes from official records. It is said he became the personal favourite of his sovereign George III and the friend of the King's brothers one of whom, William Henry Duke of Gloucester (1743-1805), the King's favourite, Adair, in the words of the author of the *Memoirs,* "apparently rescued from the jaws of death" on two occasions.

Adair's practice became very extensive and brought him a large income "while the elegance of his manners, his inoffensive deportment, and characteristic gentleness, secured him the esteem and affection of the sick and infirm of all ranks." Newman compares his philanthropy and kindly bearing towards his inferiors with the "harsh severity" and "rugged peevishness" of some of his contemporaries, naming Messrs. Pott and Else. Adair was evidently frugal in spending public money and instead of courting the danger of creating a precedent by sanctioning some new expenditures of government funds, he would rather assist those below him in the Army by giving from his own purse. The *Gentleman's Magazine* states that "a man of more honour, and more worth, has seldom lived."[1]

Lady Caroline set out for Portugal to nurse her sister who was ill with consumption. With her was her brother Captain Keppel, (Augustus Viscount Keppel) who had also been sent to America to cooperate with General Braddock in 1754, and later became an Admiral. The sister died in 1768, and Lady Caroline contracted the same disease and died in 1769.[25] She had borne her husband three children, one of whom, Robert, lived from 1763 to 1855. He became a firm friend of Charles James Fox. He sat in

parliament, and was sent abroad on several important diplomatic missions for which he was rewarded in 1831 by being made Sir Robert Adair, G.C.B.

Amongst some papers found after Lady Caroline's death was a rather strange request that her husband should wear mourning for her for the rest of his life, "if not very disagreeable to him", but I should quote from the *Memoirs,* etc., pp. 21 - 22:

> Trifles, however unimportant to others, frequently tell our love; and this minute request of Lady Caroline's, Mr. Adair religiously observed, except on two occasions in the year, the birthday of a King to whom he was personally attached, and that of his royal consort.

Adair did not marry again, although it is written that "A Countess, more remarkable for her wealth than her prudence, and the buxom widow of a Norfolk Baronet, are said to have given him *very intelligible hints* on the subject." But to quote from the *Memoirs,* p. 28, again:

> His acknowledged tenderness and generosity sometimes occasioned his being duped by the selfish views of artful females: one of this description, detestable for having ruined some years since two unhappy brothers is said to have manoeuvred with the feelings of our hero, and to have raised heavy contributions on his pocket.

In 1773 John Ranby, Surgeon to the Royal Hospital at Chelsea, died; he had succeeded Cheselden in 1752. He had been a prime mover in separating the surgeons from the barbers and, through his influence as principal Sergeant-Surgeon to George II, an Act of Parliament had been passed in 1745 establishing a Corporation consisting of a Master, Governors, and Commonalty of the Art and Science of Surgery in London, the forerunner of the Royal College of Surgeons of England. He became the first Master. Adair was angling at Richmond when the news of Ranby's death was brought to him, but drove instantly to see the King at Windsor, in his fisherman's dress and without his

"sword and bag". When he was announced, the King said: "What, Adair, let him come in directly, he knows I am always glad to see him in any dress." The "fortunate Irishman" expressed his "wish to be amongst his favourite veterans" at Chelsea and the King replied, "I promised it long ago to Middleton but, you know, Adair, I cannot refuse you."[26] On leaving the King, Adair met Robert Middleton on the road driving in haste to seek the position at Chelsea that had been promised him. While Adair was Surgeon there, that eccentric character, Messenger Monsey, the friend of Sir Robert Walpole, Lord Chesterfield, and Garrick, was Physician to Chelsea Hospital.

The Royal Hospital at Chelsea is sometimes referred to as Chelsea College, and the reason for this is found in an interesting anecdotal book by George Robert Gleig entitled *Chelsea Hospital, and its Traditions* (London, 1839). Gleig was Chaplain to the Hospital and later Chaplain-General to the forces. King James's College at Chelsea was incorporated in 1610 for the study of theology, but did not thrive owing partly to lack of funds, and it fell into the hands of the Duke of Hamilton. Charles II asked that it be presented to the Royal Society and the Duke acceded to his request, but the College was too far from London to be of use. The King purchased the building and grounds in 1681 and handed the lands over to his favourite Nell Gwyn, and there she lived in a cottage. It may have been the idea, of Charles II himself to found a hospital for "decayed and emerited" soldiers, but tradition has it that "pretty witty Nell", moved by the poverty and distress of a soldier who had fought in the civil wars, conceived the idea of such a hospital or home. (The Hôtel Royal des Invalides had been founded at Paris in 1670.) Nell ceded her rights and gave the lands back to the King and Chelsea Hospital was founded in 1682. In return she received a mansion in Pall Mall built for her by Charles. Evelyn was consulted about the Hospital—"what method to cast it in, as to the government", as he put it. Sir Christopher Wren was the architect of the magnificent

buildings, which were slowly erected and finished under William and Mary in 1690.

It was whilst Adair was Surgeon to Chelsea Hospital, in 1777, that he was sent abroad in haste with Dr. Richard Jebb to attend William Henry Duke of Gloucester, who had been banished from the court on account of his secret marriage. Jebb was then physician to St. George's Hospital and had delivered the Harveian Oration at the Royal College of Physicians in 1774. The Duke recovered quickly. The doctors brought professional skill but also conveyed a conciliatory message from the King which no doubt was better than all their prescriptions! They were richly awarded on their return and Jebb accepted a baronetcy, an honour which Adair, however, "with equal propriety and good sense, begged leave to decline."

Newman cannot refrain from saying of Adair "Nor was the solace of female society wanting to soothe his private hours", and mentions:

> the little Nightingale, with lips not only made to speak; the lively relict of a military declaimer; and the widow, or deserted wife, of a luxuriant branch of the Fox family; and a lady, who, from the bounties of nature, has not the least occasion for the artificial embellishment of cork, alternately co-operated to make him happy.[27]

Adair seems to have been less attracted by mere beauty as he grew old but sought the company of those who were "rich in literature", and "good sense", qualities which attracted, delighted and instructed him. Amongst these was the wife of a Mr. Hesse suddenly bereaved of her husband:

> But Adair, the comfort of the friendless, flew on the wings of mercy and pity, snatched her from the afflicting scene, sheltered her under the hospitable roof of his retirement at Chelsea, and applied every consolation that tranquility and the lenient hand of friendship could bestow; he was in every sense the good Samaritan, the father, and the friend.[28]

Adair was made Surgeon-General to His Majesty's Forces, in 1768, a position worth from £800 to £3 - £4000 a year, and died 16 March, 1790, at the age of nearly eighty, or, as Newman says, in his seventy-fourth year. He was buried beside his wife, according to the account of Lady Caroline, but I have not been able to discover where that was.

The *Gentleman's Magazine*,[29] contains some verses entitled "On the Death of Robert Adair, Esq., late Surgeon-General", by J. Crane, M.D. William Pinkerton's amusing comment on them was that he hoped that the doctor "was a much better physician than a poet."

The portrait of Robert Adair was painted by (Francis) Lemuel Abbott (1760-1803), the son of a Leicester clergyman. He settled in London in 1780, so that some time between this date and 1790 he executed the portrait. Adair was, therefore, somewhere between sixty-four and seventy-four years of age. The article on Abbott in the *Dictionary of National Biography* states that: "his male portraits were perfect in their likenesses." A mezzotint by John Jones (1745 [?]-1797) after this portrait was published by him in 1791. Figure 2 is a reproduction made from a copy of the mezzotint in the Dr. Thomas Addis Emmet Collection at the New York Public Library and, quite in keeping with the usual story, someone, most probably Dr. Emmet, has written in pencil below the imprint: "Wolf's Surgeon at Quebec."

Robert Adair's library was sold in London in 1791, by Benjamin White and Son. The Bodleian Library possesses a copy of the sale catalogue entitled *A Catalogue of a large and valuable Collection of Books in all Languages, and in every branch of Literature: Including the Libraries of the following Gentlemen deceased: Edmund Bott, Esq. of Christ-Church Hampshire, Robert Adair, Esq. Inspector-General of all His Majesty's Military Hospitals, etc. And the Books in Natural History of John Blake, Esq. of Parliament Street* ([IV] + 328 pp.). Below this rather formidable title is printed a select list of the books, but it is striking today to see that Harvey's *De Generatione*

Animalium, 1680, is omitted, though inside on p. 190 it is priced at one shilling—think of that and how times have changed! Robert Adair evidently possessed a good medical library of some hundreds of items.

In trying to clear up a few facts about Robert and John Adair, I have, purposely, refrained from mentioning two other men of the same family name who came out to the New World. James Adair emigrated to America in 1735 and was a trader for forty years with the Indians. He thought they came from the lost ten tribes, and wrote a *History of the American Indians,* London, 1775. James Makittrick (1728-1802), who later assumed the name Adair, was an Edinburgh graduate who practised in Antigua and wrote on yellow fever and against the abolition of the slave trade. He returned to England, set up in various places, including Bath, and was, to say the least, a colourful figure, especially in his controversial pamphlets against Philip Thicknesse.

REFERENCES

1. *Gentleman's Magazine,* 1790, lxvii, p. 282.
2. R. Hamilton, *The Duties of a Regimental Surgeon,* London, [1787], p. 212.
3. *Dictionary of National Biography,* article on Benjamin West.
4. Louis Fagan, *A Catalogue Raisonné of the Engraved Works of William Woollett,* London, 1885, p. 41.
5. *British Museum Catalogue of Engraved Portraits,* London, 1908-1925, v. 8.
6. J. Clarence Webster, *Wolfe and the Artists, a Study of his Portraiture,* Toronto, 1930, p. 69.
7. *Dictionary of National Biography,* article on James Sinclair.
8. State Papers Domestic, Entry Books, vol. 189, p. 41, in the Public Record Office, London.
9. At the time of the taking of Quebec he was "First Surgeon, North America", but I cannot prove he was at the Siege. A "George Napier" is mentioned in the key to Woollett's engraving, but he has not been identified. Sir James Napier continued to serve with the British and is last mentioned in Col. Johnston's *Roll* as "Superintendent General of all the Hospitals in North America, 25 June, 1777."

10. *Dictionary of National Biography,* article on John Campbell, fourth Earl of Loudoun.
11. See Monckton's letter quoted later.
12. War Office Papers, Series i, vol. i, 793, in the Public Record Office, London.
13. [Jeremiah Whitaker Newman] *The Lounger's Common-Place Book,* London, 1805, 3 vols.
14. William Pinkerton, *Notes and Queries,* 18 June 1864, 3rd series, v, pp. 500 - 504.
15. William Johnston, *Roll of Commissioned Officers in the Medical Service of the British Army,* Aberdeen, 1917, p. 13.
16. [Jeremiah Whitaker Newman], *Memoirs,* etc. London, 1790, pp. 11 - 14.
17. Newman, in his *Lounger's Common-place Book* (see above) says she was a countess.
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19. [Newman], *Memoirs,* pp. 15 - 16.
20. W. F. Prideaux, *Notes and Queries,* 1896, 8th series, x, p. 304.
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22. Sometimes printed *Eileen a Roon* or *Eibhlin a Ruin.*
23. *Grand Magazine of Universal Intelligence,* London, March, 1759, ii. p. 165.
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26. [Newman], *Memoirs,* pp. 29 - 30.
27. [Newman], *Memoirs,* p. 38.
28. [Newman], *Memoirs,* pp. 44 - 45.
29. *Gentleman's Magazine,* 1790, lxvii, pp. 354 - 355.

POSTGRADUATE MEDICAL EDUCATION — WITH ESPECIAL REFERENCE TO PRESENT MATERNAL MORTALITY RATES IN THE UNITED STATES

Throughout the past ninety years The New York Academy of Medicine has been actively interested in the development of opportunities for the continued education of the practicing physician. So many and complex problems were encountered in this field that the Academy in 1924 created a standing Committee on Medical Education. It has become increasingly manifest to members of this Committee that the abundant opportunities of this City for postgraduate clinical instruction are not fully utilized, especially in the obstetrical field. This need, be it said, is no less appreciated by the general practitioner than by those concerned with medical education; in fact, many educators believe that the deficiency in opportunity for adequate instructon is the chief obstacle faced by practitioners eager to obtain instruction.

This problem has induced us to review recent texts dealing authoritatively with the present status of obstetrical practice in this Country. A few extracts from these will be quoted to demonstrate the immediate need for development of postgraduate short courses in this field. The position of the United States in comparison with other nations may be judged by the following summarization in a recent Bulletin of the United States Department of Labor.*

"The official figure of the United States, which in the last few years has exceeded that of every country except Scotland, remains high no matter what method of assignment is used. Even if the method of the country assigning the smallest proportion of deaths to the puerperal state were in use in the United States, the United States figure would still exceed that of all the countries except Australia, Canada, Chile, and Scotland. Rates for the United States estimated in accordance with the assignment procedure of

* Comparability of Maternal Mortality Rates in the United States and Certain Foreign Countries (United States Department of Labor, Publication No. 229, 1935).

the respective countries are in every instance except Scotland in excess of and are in five instances more than double the official rates of the countries themselves. No matter what method of procedure is used the United States retains an exceedingly high rate as compared with other countries."

In seeking an analysis of this situation, we have turned to another report issued by the same Federal Department.† A few extracts from this careful study of Maternal Mortality in fifteen states may prove enlightening.

Maternal Care

"Although this study covered but 15 States, they represent a fair cross section of the country, and therefore it is probably fair to assume that the findings in this section are applicable to the country as a whole.

"It is discouraging to find that of the women on whom a report as to prenatal care could be obtained and who could reasonably have been expected to have such care, 54 per cent had had no prenatal examination by a physician. In only 1 per cent was the care given up to the standard that it is the right of every pregnant patient to have and to demand.

"For the deaths of the women who had had no prenatal examination the attending physician could hardly be held responsible, for he was not consulted until an emergency had arisen. Gross ignorance, carelessness, and sociological and economic problems all had a share in this responsibility. However, in those cases in which the physician was consulted he was responsible for providing adequate maternal care; and in many of these cases physicians failed in their responsibility, for half the women who did consult a physician had poor prenatal care.

"Delivery care, though as important as prenatal care, was more difficult to evaluate but certain facts were noted. For more than half the women who died in hospitals after reaching the last trimester, hospitalization was an emergency measure.

† Maternal Morbidity in Fifteen States (United States Department of Labor, Children's Bureau Publication No. 223, 1934).

"Eighty-three per cent of the women were attended by physicians, internes, or medical students, 11 per cent by midwives, 4 per cent by non-medical attendants; 2 per cent of the women had no attendant at the delivery or at the death if the patient died undelivered. Figures given in the report would indicate that, though the midwives played a part in the mortality, they could not have been responsible for any large proportion of the deaths because they attended a relatively small percentage of the cases.

"In 48 per cent of the cases the physicians described their technique, as they remembered it, in such a way that it was classified as aseptic; but obviously this is not a sure way of determining how good this technique was. The point to be noted is that the physicians themselves admitted it was unsatisfactory in more than 50 per cent of the cases.

"The almost total lack of adequate prenatal care and the relative infrequency of any prenatal care were outstanding. Besides permitting the unchecked development of unfavorable factors during pregnancy, this situation led to delivery care that was unsatisfactory because given without previous knowledge of the case and frequently in circumstances that necessitated emergency hospitalization."

Operations

"In this series of cases all the women died (and many of the babies), and, therefore, it is a record of failure. One cannot say that the operative procedures followed in many cases caused the deaths, but analysis of these procedures leads to many criticisms of the management of these cases.

"The physicians who delivered these cases cannot be blamed in all cases for the results obtained, for in 43 per cent of the operative deliveries they had not seen the women before labor or before the acute emergency had occurred. Under these circumstances it is a well-recognized fact that the operation of election is not always possible; the physician many times is forced to do something which he appreciates may not be the best but which, at the time, seems justifiable. In a study of this type the

physician's ability to do well the operation he has chosen can be evaluated only by the results, which show that many of the operations either were badly chosen or were poorly done. In nearly 40 per cent of these operative deliveries it was admitted by the physicians that their technique was at least unsatisfactory with regard to asepsis. It is therefore not to be wondered at that 26 per cent of the deaths following forceps deliveries and 19 per cent of the deaths following versions were due to sepsis. An operative delivery is a surgical procedure and should not be undertaken by physicians untrained in surgical technique. It is evident that many of these physicians did not have such training.

Abortions

"That one-quarter of all the maternal deaths in this study followed some type of abortion is probably the most outstanding finding of the study. The further finding that three-quarters of the deaths following abortion were due to puerperal septicemia is equally significant.

Puerperal Septicemia

"That 40 per cent of all the deaths in this study were of women who had such obvious and unmistakable signs of sepsis that there could be no question how they should be classified shows clearly the serious condition presented by this cause of maternal death.

"No matter how the figures are analyzed, it is clear that the loss of life from sepsis is enormous. That in the last trimester of pregnancy 1,529 women of this series died of sepsis, 94 per cent of whom had a spontaneous onset of labor and 65 per cent a spontaneous termination of labor, is nothing short of appalling.

"What is the reason for the existence of this condition? It is due to lack of proper teaching of obstetrics in some of the medical schools, lack of opportunity to deliver a sufficient number of normal cases, and almost total lack of experience in the simplest obstetric operating, or else it is due to the willful disregard by careless physicians of the fundamentals of asepsis.

Toxemias of Pregnancy

"The chief method of attack against the severe toxemias of pregnancy is conceded to be their early detection and control. For this it is necessary to have continuous intelligent medical supervision of the prospective mother from early in pregnancy, early recognition of untoward symptoms, prompt and judicious treatment of symptoms as they appear during pregnancy as well as during and after actual delivery of the patient, and the cooperation of the patient.

"Probably it is now generally conceded that radical treatment in eclampsia is never indicated except in the best environment and with proper anesthetic. The dire results of teaching radical treatment for eclampsia were manifest —almost universal resort to immediate operative interference in all kinds of cases and by all kinds of practitioners.

"Few of these women were treated along the conservative lines now accepted—with fluids, glucose, magnesium sulphate, and morphine or other sedative and induction of labor. There can be no question that failure to institute prompt treatment and the injudicious treatment they did receive contributed to many of the deaths. It is evident, therefore, that some safe, conservative treatment for eclampsia should be agreed upon and that knowledge of it should be widely disseminated."

Puerperal Hemorrhage

"If the onset of hemorrhage in placenta previa were accompanied by pain, patients would apply for treatment sooner and would not be content with inactivity on the part of the physician. Of 234 cases in which warning bleeding occurred, it was ignored by the patient or by the physician in 216, and in more than half these cases it was the physician who was responsible for the delay."

The report from which these quotations have just been made concludes with the carefully considered and comprehensive recommendations of the Advisory Committee. From these we extract the following which relate to the need for greater opportunities for postgraduate instruction.

(*c*) "In order that physicians in general may have a better understanding of the fundamentals of obstetric care:

1. There should be larger and better facilities for clinical training in obstetrics.
2. Undergraduate students should have a much wider contact with obstetric patients.
3. The State medical societies, the medical schools, and State departments of health should provide or arrange for postgraduate teaching in the various counties in order to keep the local practitioner in touch with the best obstetric thought and practice."

It becomes more and more apparent as one studies the problem that, whereas lack of adequate prenatal care, economic and other sociological factors influence the maternal mortality rates in the United States, a most ponderable factor is the lack of opportunity for the general practitioner to receive training in obstetrics.

When one studies current statistical reports of maternal mortality in the United States and the analyses of these reports by the best informed men in this field, it is not to be wondered that leading men engaged in practice in this special field in this State and City are so insistent upon the development of opportunities for general practitioners to obtain the fundamental training necessary to enable them to recognize and cope with the chief obstetrical emergencies presented in their practice. In this City, since the Lying-In Hospital has been absorbed by the New York Hospital for undergraduate teaching, there does not appear to be any very large obstetrical service available for postgraduate clinical instruction in obstetrics. At any rate the existing resources are not fully exploited.

RECENT ACCESSIONS TO THE LIBRARY

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NOVEMBER 19

Drugs in the treatment of heart disease.

The actions and uses of the various medicinal remedies employed as therapeutic agents will be discussed. Consideration will be given to the indications for using particular drugs, as well as to their limitations and toxic effects. Drug therapy will be related to the general management of the cardiac patient.

ROBERT L. LEVY, *Professor of Clinical Medicine, College of Physicians and Surgeons, Columbia University.*

NOVEMBER 26

Anterior pituitary—its hormones relative to diagnosis and therapy.

Recent biological investigation and chemical studies upon the hypophysis have strikingly confirmed previously accepted clinical syndromes. These newer concepts and their relationship to diagnostic understanding of anterior lobe functions and clinical pictures are revealing and open up further possibilities for therapy. Older ideas on therapy will be discussed in relation to the new biological products and the success and failures of these will be noted. Functional pituitary disturbances in relation to the anterior lobe hormones are of especial importance and transcend such characteristic pictures as neoplasms, acromegaly, etc. Their symptomatology and treatment will be discussed.

IRVING H. PARDEE, *Chief of Service, Neurological Institute.*

DECEMBER 3

Newer laboratory aids and their clinical value.

The appraisal of tests which can be done by the average physician, including some of the newer chemical and serological determinations.

FRANKLIN M. HANGER, *Associate Professor of Medicine, College of Physicians and Surgeons, Columbia University.*

DECEMBER 10

The problem of the jaundiced patient.

The preoperative preparation, the problems of operation and the postoperative care will be touched upon. The unreliability of the liver function tests will be reviewed. The problem of improving the liver cells prior to operation will be discussed. The postoperative complications and their method of control will be reviewed.

I. S. RAVDIN, *Harrison Professor of Surgery, University of Pennsylvania.*

DECEMBER 17

Recent advances in the diagnosis and treatment of peripheral vascular diseases.

Newer developments in the classification, diagnosis and treatment of various conditions affecting primarily the peripheral blood vessels will be discussed, with particular reference to publications during the past few years. The newer therapeutic procedures will be described and summarized.

EUGENE M. LANDIS, *Assistant Professor of Medicine, University of Pennsylvania.*

1938

JANUARY 7

Treatment of pneumonia.

RUFUS COLE.

JANUARY 14

Bulkley Lecture: Cancer of the gastrointestinal tract.

Carcinoma of the gastrointestinal tract, if seen early and operated on radically, offers a favorable prognosis. The larger percentage of such lesions, however, reach a surgeon when the condition has become inoperable, due to fixation to surrounding structures or extensive metastatic involvement. Attention will be called to early diagnostic signs and symptoms, followed by a presentation of the most modern surgical procedures.

CARL EGGERS, *Professor of Clinical Surgery, College of Physicians and Surgeons, Columbia University.*

JANUARY 21

Recent advances in common diseases of children.

Consideration of a certain number of those diseases in which the diagnosis or the therapy or both have been modified as a result of recent contributions.

SAMUEL Z. LEVINE, *Professor of Pediatrics, Cornell University Medical College.*

JANUARY 28

Endocrine therapy in gynecology.

The various agents available for endocrine therapy, particularly the glandular products, but with mention of radiation and surgery where these agents influence the endocrine status of the pelvic organs; the diagnostic measures which should be carried out, to exclude the conditions for which endocrine therapy is contraindicated, and to differentiate between the types of endocrine disorders; the actual conditions for which endocrine therapy may be used, with an outline of the treatment to be instituted.

HOWARD C. TAYLOR, JR., *Associate Professor of Gynecology and Obstetrics, New York University Medical School.*

FEBRUARY 4

What can orthopedic surgery do for the arthritic cripple?

The author will present the thesis that there is an important place for reconstructive surgery in the treatment of many patients apparently hopelessly crippled as a result of chronic arthritis. He will discuss the various operative procedures as employed in a series of patients treated during the last fifteen years. He will discuss the underlying pathological condition which needs to be corrected and present the indications and contraindications for surgery. There should be a wider understanding of the possibilities of obtaining relief from surgery in some of these cases.

PHILIP D. WILSON, *Surgeon-in-Chief, Hospital for Ruptured and* Crippled.

FEBRUARY 11

A consideration of nervous and mental disease in general practice.

FOSTER KENNEDY, *Director of Neurological Department, Bellevue Hospital.*

FEBRUARY 18

Convalescent measles and scarlet fever serums; their value in prophylaxis and therapy.

A short historic resumé of the prophylactic and therapeutic use of convalescent measles and scarlet fever serums; the manner of securing and preparing the serums, particularly the safeguards to insure potent and safe serums. Discussion of results to prevent an attack of measles or to attenuate the attack in children exposed to this disease; the importance of preventing this disease in children under five years of age; the treatment of measles in the prodromal period; and the prevention and treatment of scarlet fever.

WILLIAM THALHIMER, *Director, Manhattan Convalescent Serum Laboratory.*

FEBRUARY 25

Lobectomy and pneumonectomy.

A discussion of the indications for resection of a lobe or one entire lung for infections and neoplasms. Special reference will be made to the use of radical surgery in the treatment of bronchiectasis, chronic lung abscess, benign and malignant tumors of the lung.

EDWARD D. CHURCHILL, *John Homans Professor of Surgery, Harvard Medical School.*

MARCH 4

The evaluation of recent therapeutic procedures.

This lecture will consist in a resumé of the various newly introduced procedures in the field of general therapeutics, including pharmacology, diet therapy, physiotherapy and hydrotherapy.

MILTON A. BRIDGES, *Assistant Professor of Clinical Medicine, New York Post-Graduate Medical School, Columbia University.*

MARCH 11

Various types of colitis, with particular reference to ulcerative colitis.

Discussion of various types of colitis, differentiating the infectious and non-infectious. The causative agent and essential pathology of each type will be brought out sufficiently to provide a basis for treatment.

THOMAS T. MACKIE, *Research Associate, Cornell University Medical College.*

MARCH 18

The modern treatment of diabetes mellitus.

Review of recent advances in our knowledge of diabetes. Principles of treatment. Application of this knowledge in the treatment of the diabetic patient. Present status of carbohydrates, protein and fat in the diabetic diet. The use of insulin and protamine insulin. Management of the ambulatory diabetic, the operative diabetic, diabetes with acute infections and diabetic acidosis.

JAMES RALPH SCOTT, *Chairman, New York Diabetes Association.*

MARCH 26

The recognition and management of common skin diseases in general practice.

The logical domain of the general practitioner in relation to the dermatologist will be considered. The general practitioner's management of acne vulgaris and of common eczematous dermatoses, including eczematous "ringworm," will be discussed in detail. Special emphasis will be placed on the rationale of therapeutic procedures, as viewed in the light of newer concepts of etiology and pathogenesis. The entire subject will be presented on a rigidly practical basis with the object of demonstrating those modern and accepted therapeutic measures which can actually be applied in general practice.

MARION B. SULZBERGER, *Assistant Professor of Clinical Dermatology and Syphilology, New York Post-Graduate Medical School, Columbia University.*

APRIL 1

Rheumatic fever.

A review of the current concepts of the nature of the disease, including certain indications in therapy.

HOMER F. SWIFT, *Member of The Rockefeller Institute.*

APRIL 8

The physiology of the liver metabolism as a basis for liver function tests and diet treatment.

Discussion of the normal function of the liver in regard to the intermediary metabolism. Critical evaluation of the liver function tests for diagnosis. Suggestions for diet treatment of liver diseases.

S. J. THANNHAUSER, *Associate Professor, Tufts Medical School.*

APRIL 15

The treatment of hemolytic streptococcus infections.

A discussion of the treatment with particular reference to drugs and serums such as prontosil, erysipelas antitoxin, scarlet fever antitoxin, convalescent serum, etc.

REUBEN OTTENBERG, *Assistant Professor of Clinical Medicine College of Physicians and Surgeons, Columbia University.*

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